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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,815	10/07/2004	Markus Schwerdtfeger	P 7591 US	5814

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GUDRUN E. HUCKETT DRAUDT
LONSSTR. 53
WUPPERTAL, 42289
GERMANY

EXAMINER

SPAHN, GAY

ART UNIT	PAPER NUMBER
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3673

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/711,815		SCHWERTDFEGER, MARKUS	
	Examiner		Art Unit	
	Gay Ann Spahn		3673	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 October 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the

(1) "sealing lip and the shell are comprised of different materials" as recited in claim 3,

(2) "at least one of the first conical surface and the second conical surface has at least one conveying structure" as recited in claim 11,

(3) "at least one conveying structure is selected from the group consisting of grooves, wave-shaped profiles, and ribs" as recited in claim 12,

(4) "conveying structure on the second conical surface is oriented opposite to the conveying structure of the first conical surface" as recited in claim 13,

(5) "sealing lip is prestressed by a spring force in a direction toward the rotary machine part" as recited in claim 14,

(6) "at least one of the first conical surface and the second conical surface has a wave-shaped profile in a circumferential direction of the sealing ring" as recited in claim 15, and

(7) "wave-shaped profile is generated by an appropriate shaping of the support ring" as recited in claim 16,

must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to because:

(1) Fig. 1, the angles α and β must be shown as being between two lines (i.e., a first line extending from the conical surfaces (7, 8) as already shown and a second line extending from and tangent to the surface of the shaft (6)).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character not mentioned in the description:

(1) reference numeral "9" (see reference numeral "9" in Fig. 1 on left-hand side of page with lead line leading to left-hand side of sealing lip (4)).

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

(10) page 10 of 10 of the specification is a blank page and should be deleted.

Appropriate correction is required.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13, line 2, the recitation that “the conveying structure on the second conical surface is oriented opposite to the conveying structure of the first conical surface” is vague, indefinite, and confusing as lacking antecedent basis since claim 11 (on which claim 13 depends) only recites a single conveying structure on either the first conical surface or the second conical surface.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Reinhardt et al. (U.S. Patent No. 6,520,506).

As to claim 1, Reinhardt et al. disclose a radial shaft seal (1) comprising:

a sealing ring comprising a support housing (2) and a shell of elastomer material (cross-hatched area) surrounding at least partially the support housing (2);

wherein the sealing ring comprises a sealing lip (3) having a sealing edge (13) or sealing surface configured to rest seal-tightly against a rotary machine part (5);

wherein the sealing lip (3) has a first conical surface (16) at a first side facing a medium to be sealed (6) and a second conical surface (14) at a second side facing a surrounding atmosphere (7), wherein the first and second conical surfaces (16, 14) adjoin the sealing lip (3);

wherein between the rotary machine part (5) and the first conical surface (16) a first contact surface angle (β) is formed and wherein between the rotary machine part (5) and the second conical surface (14) a second contact surface angle (α) is formed;

wherein the first contact surface angle (β) is adjusted to be between approximately 0 degrees and approximately 30 degrees (see col. 2, lines 28-29, wherein it states that the beta angle is selected to be between 15 to 30 degrees, preferably 17 to 22 degrees) and the second contact surface angle (α) is adjusted to be between approximately 30 degrees up to approximately 70 degrees (see col. 2, lines 29-30, wherein it states that the alpha angle is selected to be between 35-65 degrees, preferably 45 to 60 degrees).

As to claim 2, Reinhardt et al. disclose the radial shaft seal according to claim 1 as discussed above, and Reinhardt et al. also disclose that the sealing lip (3) is a monolithic part of the shell (cross-hatched area).

As to claim 14, Reinhardt et al. disclose the radial shaft seal according to claim 1 as discussed above, and Reinhardt et al. also disclose that the sealing lip (3) is

prestressed by a spring force (via spring 4) in a direction toward the rotary machine part (shaft 5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reinhardt et al. (U.S. Patent No. 6,520,506), as applied to claim 1 above, and further in view of any one of Johnston '624 (U.S. Patent No. 6,729,624), Bainard (U.S. Reissue Patent No. Re. 33,029), Otto (U.S. Patent No. 6,050,570), or Matsushima et al. (U.S. Patent 6,182,975).

As to claim 3, Reinhardt et al. disclose the radial shaft seal according to claim 1 as discussed above.

However, Reinhardt et al. fail to explicitly disclose that the sealing lip and the shell are comprised of different materials, respectively.

Any one of Johnston '624 (see resinous ring (50) of Figs. 12A-12c), Bainard (see liner (26) of Fig. 3), Otto (see insert (66) of Fig. 2), or Matsushima et al. (see resin liner (407) of prior art Fig. 13) discloses that the sealing lip (Teflon[®] material) and the shell (elastomeric material) are comprised of different materials, respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the radial shaft seal of Reinhardt et al. by making the sealing lip be made of a different material (i.e., Teflon[®] material) than the material of the shell (i.e., elastomeric material) as taught by any one of Johnston '624, Bainaird, Otto, or Matsushima et al. in order for the sealing lip to slide more easily on the rotating shaft and thereby, cause less wear damage.

Claims 4-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reinhardt et al. (U.S. Patent No. 6,520,506), as applied to claim 1 above, and further in view of Mohr (U.S. Patent No. 6,722,659) and Hosokawa et al. (U.S. Patent No. 6,367,811).

As to claim 4, Reinhardt et al. disclose the radial shaft seal according to claim 1 as discussed above.

However, Reinhardt et al. fail to explicitly disclose a support ring against which support ring the sealing ring rests, wherein the support ring is arranged on a side of the sealing ring facing the surrounding atmosphere.

Mohr (see Fig. 2) discloses a common variant of a shaft seal wherein protective lip (15 as shown in Fig. 1) is not provided (see col. 1, lines 60-62).

Hosokawa et al. disclose a support ring (12 in Fig. 4) against which support ring (12) the sealing ring (5) rests, wherein the support ring (12) is arranged on a side of the sealing ring (5) facing the surrounding atmosphere.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the radial shaft seal of Reinhardt et al. by making the elastomeric body be configured as the common variant that does not have a second sealing lip as taught by Mohr and by including support ring against the sealing ring on a side of the sealing ring facing the surrounding atmosphere as taught by Hosokawa et al. in order to provide extra support for the conical surface of the seal lip on the air side so as to protect the sharp tip of the sealing lip from being worn down.

As to claim 5, Reinhardt et al. in view of Mohr and Hosokawa et al. disclose the radial shaft seal according to claim 4 as discussed above, and Hosokawa et al. also disclose that the support ring (12) has an L-shaped cross-section.

As to claim 6, Reinhardt et al. in view of Mohr and Hosokawa et al. disclose the radial shaft seal according to claim 4 as discussed above, and Hosokawa et al. also disclose that the support ring (12) comprises an axial part (16) resting against the sealing lip (13b).

As to claim 7, Reinhardt et al. in view of Mohr and Hosokawa et al. disclose the radial shaft seal according to claim 6 as discussed above, and Hosokawa et al. also disclose that the axial part (16) of the support ring (12) has a conical support surface (extending above dashed line illustrating bottom limit of angle θ) tapering in a direction toward the medium to be sealed (33).

As to claim 8, Reinhardt et al. in view of Mohr and Hosokawa et al. disclose the radial shaft seal according to claim 7 as discussed above, and Hosokawa et al. also

disclose that the conical support surface (extending above dashed line illustrating bottom limit of angle θ) has an angle matching the first contact surface angle.

As to claim 9, Reinhardt et al. in view of Mohr and Hosokawa et al. disclose the radial shaft seal according to claim 6 as discussed above, and Hosokawa et al. also disclose that the support ring (12) comprises a radial part (15), wherein the support housing (2) and the shell (5) rest against the radial part (15) of the support ring (12).

As to claim 10, Reinhardt et al. in view of Mohr and Hosokawa et al. disclose the radial shaft seal according to claim 9 as discussed above, and Hosokawa et al. also discloses that the radial part (15) of the support ring (12) extends essentially across an entire radial width of the sealing ring (5).

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reinhardt et al. (U.S. Patent No. 6,520,506), as applied to claim 1 above, and further in view of Onuma et al. (U.S. Patent No. 6,036,193).

As to claim 11, Reinhardt et al. disclose the radial shaft seal according to claim 1 as discussed above.

However, Reinhardt et al. fail to explicitly disclose that at least one of the first conical surface and the second conical surface has at least one conveying structure.

Onuma et al. disclose that at least one of the first conical surface (28) and the second conical surface (30) has at least one conveying structure (ribs 40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the radial shaft seal of Reinhardt et al. by making at least

one of the first conical surface and the second conical surface have at least one conveying structure as taught by Onuma et al. in order to in order to provide pumping action by the ribs to improve the hydrodynamic sealing capabilities.

As to claim 12, Reinhardt et al. in view of Onuma et al. disclose the radial shaft seal according to claim 11 as discussed above, and Onuma et al. also disclose that the at least one conveying structure (ribs 40) is selected from the group consisting of grooves, wave-shaped profiles, and ribs.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reinhardt et al. (U.S. Patent No. 6,520,506) in view of Onuma et al. (U.S. Patent No. 6,036,193), as applied to claim 11 above, and further in view of Dietle (U.S. Patent No. 6,494,462).

As to claim 13, Reinhardt et al. in view of Onuma et al. disclose the radial shaft seal according to claim 11 as discussed above.

However, both Reinhardt et al. in view of Onuma et al. fail to explicitly disclose that the conveying structure on the second conical surface is oriented opposite to the conveying structure of the first conical surface.

Dietle (see Figs. 6, 6A-G, 7, 7A-B, 8, 9, 14, and 14A-c) discloses that the conveying structure (18) on the second conical surface (8) is oriented opposite to the conveying structure (18) of the first conical surface (54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the radial shaft seal of Reinhardt et al. in view of Onuma

et al. so that the conveying structure on the second conical surface is oriented opposite to the conveying structure of the first conical surface as taught by Dietle in order to provide for controlled lubrication movement within the dynamic sealing interface between the seal and the relatively rotatable surface of the shaft.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reinhardt et al. (U.S. Patent No. 6,520,506), as applied to claim 1 above, and further in view of Johnston '387 (U.S. Patent No. 5,427,387).

As to claim 15, Reinhardt et al. disclose the radial shaft seal according to claim 1 as discussed above.

However, Reinhardt et al. fail to explicitly disclose that the at least one of the first conical surface and the second conical surface has a wave-shaped profile in a circumferential direction of the sealing ring.

Johnston '387 discloses that the at least one of the first conical surface (2.1) and the second conical surface (unnumbered, but adjacent sealing lip 2 on other side than inner surface 2.1) has a wave-shaped profile (2 in Fig. 3) in a circumferential direction of the sealing ring (see col. 5, line 65 through col. 6, line 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the radial shaft seal of Reinhardt et al. by making at least one of the first conical surface and the second conical surface have a wave-shaped profile in a circumferential direction of the sealing ring as taught by Johnston '387 in order to provide a radial shaft sealing ring that exhibits excellent operating properties

across a long service life with improved sealing and reduced leakage, both when the shaft is at rest and when the shaft is rotating.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reinhardt et al. (U.S. Patent No. 6,520,506) in view of Johnston '387 (U.S. Patent No. 5,427,387), as applied to claim 15 above, and further in view of Mohr (U.S. Patent No. 6,722,659) and Hosokawa et al. (U.S. Patent No. 6,367,811).

As to claim 16, Reinhardt et al. in view of Johnston '387 disclose the radial shaft seal according to claim 15 as discussed above.

However, both Reinhardt et al. and Johnston '387 fail to explicitly disclose a support ring against which support ring the sealing ring rests, wherein the support ring is arranged on a side of the sealing ring facing the surrounding atmosphere, wherein the wave-shaped profile is generated by an appropriate shaping of the support ring.

Mohr (see Fig. 2) discloses a common variant of a shaft seal wherein protective lip (15 as shown in Fig. 1) is not provided (see col. 1, lines 60-62).

Hosokawa et al. disclose a support ring (12 in Fig. 4) against which support ring (12) the sealing ring (5) rests, wherein the support ring (12) is arranged on a side of the sealing ring (5) facing the surrounding atmosphere, wherein the wave-shaped profile is generated by an appropriate shaping of the support ring.

The examiner notes that the recitation of "wherein the wave-shaped profile is generated by an appropriate shaping of the support ring" is a method limitation and

therefore, has no weight in a product (i.e., radial shaft seal) claim. Therefore, the examiner deems this limitation to be met by Hosokawa et al.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the radial shaft seal of Reinhardt et al. in view of Johnston '387 by making the elastomeric body be configured as the common variant that does not have a second sealing lip as taught by Mohr and by including support ring against the sealing ring on a side of the sealing ring facing the surrounding atmosphere as taught by Hosokawa et al. in order to provide extra support for the conical surface of the seal lip on the air side so as to protect the sharp tip of the sealing lip from being worn down.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Various sealing members are shown in: U.S. Patent No. 3,929,340 to Peisker (see Fig. 4); U.S. Patent No. 3,921,992 to Bertin; U.S. Patent No. 4,964,647 to Stephan; U.S. Patent No. 3,214,179 to Dega; U.S. Patent No. 5,143,385 to Sponagel et al.; U.S. Patent No. 4,410,190 to Potter; U.S. Patent No. 5,813,676 to Antonini et al.; U.S. Patent No. 6,053,502 to Hallenstvedt; U.S. Patent No. 4,094,519 to Heyn et al.; U.S. Patent No. 4,874,261 to Colanzi et al.; U.S. Patent No. 3,973,779 to Burgmann et al.; and U.S. Patent No. 6,746,018 to Lewis et al.

Various conveying structure is shown in: U.S. Patent No. 3,923,315 to Hadaway; U.S. Patent No. 6,726,211 to Kuroki et al.; U.S. Patent No. 3,504,920 to Halliday; U.S.

Patent No. 3,633,927 to Van Deven; U.S. Patent No. 3,785,660 to Bush; U.S. Patent No. 3,620,540 to Jagger; U.S. Patent No. 3,586,342 to Staab; U.S. Patent No. 3,895,814 to Kupfert et al.; U.S. Patent No. 3,873,104 to Bainard; U.S. Patent No. 3,912,987 to Johnston et al.

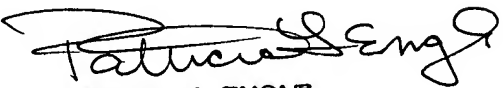
Various sealing ring supporting structure is shown in: U.S. Patent No. 2,998,987 to Taschenberg et al.; U.S. Patent No. 6,431,552 to Ulrich; U.S. Patent No. 4,300,778 to Gagne; U.S. Patent No. 6,334,619 to Dietle et al.; U.S. Patent No. 6,173,961 to Martin; and U.S. Patent No. 6,123,514 to Kawaguchi et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gay Ann Spahn whose telephone number is (571)-272-7731. The examiner can normally be reached on Monday through Thursday, 8:30 am to 7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia L. Engle can be reached on (571)-272-6660. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

^{GAS}
Gay Ann Spahn, Patent Examiner
February 18, 2006



PATRICIA L. ENGLE
PRIMARY EXAMINER

Art Unit 3673

2-21-06